CLAIMS

We Claim:

1. A photolithography system comprising:

a stage suitable for supporting a patterned reticle or a semiconductor wafer;

a stage rib panel attached to a surface of said stage, said stage rib panel being magnetizable and having substantially parallel rows of ribs, said stage rib panel suitable for collecting heat generated from within said stage;

a frame having an internal slot wherein said stage is contained within said slot; and

a frame rib panel attached to a surface of said frame such that said stage rib panel and said frame rib panel face each other, said frame rib panel being magnetizable and having substantially parallel rows of ribs, wherein one or more magnetic fields are sequentially generated within said frame rib panel in order to impose electromagnetic forces upon said stage rib panel to move said stage with respect to said frame.

2. A photolithography system as recited in claim 1 wherein said stage rib panel is a suitable surface from which heat can dissipate out of said stage rib panel and out of said stage.

3. A photolithography system as recited in claim 2 further comprising:

at least one cooling device suitable for lowering or maintaining the temperature of said frame rib panel such that the temperature of said frame rib panel is approximately less than the temperature of said stage rib panel, whereby heat dissipated from said stage rib panel can be collected into said frame rib panel.

4. A photolithography system as recited in claim 3 wherein said cooling device includes a fluid channel that is in thermal communication with said frame rib panel, wherein coolant fluid flows within said fluid channel.

5. A photolithography system as recited in claim 1 further comprising:

at least one heat-generating device positioned within said stage;

at least one thermal pathway formed between said stage rib panel and each of said heat generating devices wherein each thermal pathway allows heat to travel from a respective heat generating device to said stage rib panel.

6. A photolithography system as recited in claim 5 wherein said heat-generating device is a reticle, a reticle chuck, an integrated circuit device, or a sensor.

7. A photolithography system as recited in claim 6 wherein said integrated circuit device or sensor is positioned approximately adjacent to said stage rib panel, whereby the distance in which heat from said integrated circuit device or sensor travels to said stage rib panel is minimized.

8. A photolithography system as recited in claim 5 wherein said thermal pathway is a thermally conductive material connected to each of said heat-generating device and said stage rib panel.

9. A photolithography system as recited in claim 2 wherein each adjacent rib of said stage rib panel is separated by a recessed channel, said photolithography system further comprising:

a filler material that fills in each of the recessed channels of the stage rib panel such that said stage rib panel has a substantially flat surface formed of said filler material and a top surface of each of said ribs, whereby said flat surface facilitates heat dissipation out of said stage rib panel and said stage.

10. A photolithography system as recited in claim 9 wherein each adjacent rib of said frame rib panel is separated by a recessed channel, said photolithography system further comprising:

a filler material that fills in each of the recessed channels of the frame rib panel such that said frame rib panel has a substantially flat surface formed of said filler material and a top surface of each of said ribs, whereby said flat surface facilitates collection of said heat dissipated out of said stage rib panel and said stage.

11. A photolithography system as recited in claim 1 further comprising:

a transformer that includes an inductive core, a primary inductive coil, and a secondary inductive coil, wherein the inductive core has a first and a second end and wherein the primary inductive coil is wrapped around the first end of the inductive core,

said stage housing the secondary inductive coil,

said frame supporting the inductive core such that the second end of the inductive core extends into the secondary inductive coil, wherein each side surface of the inductive core maintains a minimum distance of separation from an inner surface of the secondary inductive coil, whereby an electrical current within the primary coil creates an electromagnetic field that causes electrical current to flow within the secondary inductive coil; and

wherein said secondary inductive coil is adjacent to said stage rib panel such that heat generated by said secondary inductive coil is collected by said stage rib panel.

12. A photolithography system as recited in claim 1 further comprising:

an Lorentz force electromagnetic motor for adjusting the position of said stage with respect to said frame, said Lorentz force electromagnetic motor including,

a row of opposing magnets within said stage wherein each of the opposing magnets have opposite magnetic polarities, and

a lengthwise coil assembly within said slot of said frame that extends through said stage and between said row of opposing magnets, wherein said coil assembly generates heat that is collected by said stage rib panel.

13. A photolithography system as recited in claim 1 wherein said stage has a top surface and a bottom surface and said slot of said frame has a ceiling surface and a floor surface, and wherein said stage rib panel is attached to said top surface of said stage and said frame rib panel is attached to said ceiling surface of said slot of said frame.

14. A photolithography system as recited in claim 13 further comprising an additional set of stage and frame rib panels wherein said additional stage rib panel is attached to said bottom surface of said stage and said additional frame rib panel is attached to said floor surface of said slot of said frame.

15. A photolithography system comprising:

a stage suitable for supporting a patterned reticle or a semiconductor wafer, said stage having a top surface and a bottom surface;

a frame having an internal slot, said internal slot having a ceiling surface and a floor surface, wherein said stage is contained within said slot;

a variable reluctance electromagnetic motor that includes,

at least two stage rib panels attached to each of said top and bottom surfaces of said stage, said stage rib panels being magnetizable and having parallel rows of ribs that are each separated by a recessed channel, said stage rib panels suitable for collecting heat generated from within said stage;

at least two frame rib panels attached to each of said ceiling and floor surfaces of said frame such that each stage rib panel faces an opposing frame rib panel, said frame rib panels being magnetizable and having parallel rows of ribs that are each separated by a recessed channel, wherein one or more magnetic fields are sequentially generated within said frame rib panel in order to impose electromagnetic forces upon said stage rib panel to accelerate said stage to a desire velocity with respect to said frame along a scanning axis; and

a first Lorentz force electromagnetic motor for adjusting the said velocity of said stage along said scanning axis, said first Lorentz force electromagnetic motor including,

a row of opposing magnet pairs within said stage wherein each magnet of each magnet pairs has an opposite magnetic polarity and wherein a magnetic field is created between each opposing magnet pair, and

a lengthwise coil assembly within said slot of said frame that extends through said stage and between said row of opposing magnets, said coil assembly having a plurality of wire coils, wherein a current within each wire coil and each of said magnetic fields generates an electromagnetic force suitable for adjusting the velocity of said stage.

16. A photolithography system as recited in claim 15 further comprising:

a second Lorentz force electromagnetic motor for adjusting the said velocity of said stage along an axis that is orthogonal to said scanning axis, said second Lorentz force electromagnetic motor including,

a row of opposing magnet pairs within said stage wherein each magnet of each magnet pairs has an opposite magnetic polarity and wherein a magnetic field is created between each opposing magnet pair, and

a lengthwise coil assembly within said slot of said frame that extends through said stage and between said row of opposing magnets, said coil assembly having a plurality of wire coils, wherein a current within each wire coil and each of said magnetic fields generates an electromagnetic force suitable for adjusting the velocity of said stage.

17. A photolithography system as recited in claim 15 wherein the parallel rows of ribs in each of the stage and frame rib panels are substantially parallel to each other.

18. A photolithography system as recited in claim 15 wherein each of said stage rib panels are a suitable surface from which heat can dissipate out of said stage rib panels and out of said stage.

19. A photolithography system as recited in claim 18 further comprising:

at least one heat-generating device positioned within said stage;

at least one thermal pathway formed between each of said stage rib panels and each of said heat generating devices wherein each thermal pathway allows heat to travel from a respective heat generating device to said stage rib panels.

20. A photolithography system as recited in claim 19 wherein said heat-generating device is a reticle, a reticle chuck, an integrated circuit device, or a sensor.

21. A photolithography system as recited in claim 20 wherein said integrated circuit device or sensor is positioned approximately adjacent to one of said stage rib panels, whereby the distance in which heat from said integrated circuit device or sensor travels to said stage rib panel is minimized.

22. A photolithography system as recited in claim 18 further comprising:

at least one cooling device suitable for lowering or maintaining the temperature of said frame rib panel such that the temperature of said frame rib panel is approximately less than the temperature of said stage rib panel, whereby heat dissipated from said stage rib panel can be collected into said frame rib panel.

23. A photolithography system as recited in claim 18 further comprising a filler material that fills in each of the recessed channels of each of said stage rib panels such that said stage rib panels have a substantially flat surface formed of said filler material and a top surface of each of said ribs, whereby said flat surface facilitates heat dissipation out of said stage rib panels and said stage.

24. A photolithography system as recited in claim 23 further comprising a filler material that fills in each of the recessed channels of said frame rib panels such that said frame rib panels have a substantially flat surface formed of said filler material and a top surface of each of said ribs, whereby said flat surface facilitates collection of said heat dissipated out of said stage rib panels and said stage.

25. A photolithography system as recited in claim 18 further comprising:

a transformer that includes an inductive core, a primary inductive coil, and a secondary inductive coil, wherein the inductive core has a first and a second end and wherein the primary inductive coil is wrapped around the first end of the inductive core,

said stage housing the secondary inductive coil,

said frame supporting the inductive core such that the second end of the inductive core extends into the secondary inductive coil, wherein each side surface of the inductive core maintains a minimum distance of separation from an inner surface of the secondary inductive coil, whereby an electrical current within the primary coil creates an electromagnetic field that causes electrical current to flow within the secondary inductive coil; and

wherein said secondary inductive coil is adjacent to at least one of said stage rib panels such that heat generated by said secondary inductive coil is collected by said stage rib panels.

26. A photolithography system comprising:

an illumination source;

an optical system;

a reticle stage suitable for supporting a patterned reticle;

a working stage arranged to retain a workpiece;

an enclosure that surrounds at least a portion of the working stage, the enclosure having a sealing surface;

a stage rib panel attached to a surface of said stage, said stage rib panel being magnetizable and having parallel rows of ribs that are each separated by a recessed channel, said stage rib panel suitable for collecting heat generated from within said stage;

a frame having an internal slot wherein said stage is contained within said slot; and

a frame rib panel attached to a surface of said frame such that the stage rib panel and the frame rib panel face each other, said frame rib panel being magnetizable and having parallel rows of ribs that are each separated by a recessed channel, wherein one or more magnetic fields are sequentially generated within said frame rib panel in order to impose electromagnetic forces upon said stage rib panel to move said stage with respect to said frame.

27. An object manufactured with the photolithography system of claim 26.

28. A wafer on which an image has been formed by the photolithography system of claim 26.

29. A method for making an object using a photolithography process, wherein the photolithography process utilizes a photolithography system as recited in claim 26.

30. A method for patterning a wafer using a photolithography process, wherein the photolithography process utilizes a photolithography system as recited in claim 26.